Image: Florida Museum of Natural History

Sociality III: Symbioses

FISH 310

Cymothoa exigua in the mouth of *Amphiprion*

Today's Roadmap:

1. What's a symbiosis?
2. Parasitism
3. Commensalism
4. Mutualism
5. Teamwork

Animal Interactions

1. **Competition**: negative effect on both species **(-/-)** (ecological niches overlap and require similar resources)

symbiotic relationships

2. **Mutualism**: symbiosis in which both species benefit **(+/+)**
3. **Commensalism**: one species benefits and the other is unaffected **(+/0)**
4. **Parasitism**: symbiosis in which one species benefits and the other is harmed **(+/-)**
5. **Predation**: one species feeds on another animal species **(+/-)**
6. **Herbivory**: one species feeds on an autotrophic species **(+/-)**

commensalism
remoras

mutualism
cleaner wrasse

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Parasitism: symbiosis in which one species benefits and the other is harmed **(+/-)**

- **External** parasites of fishes are speciose and abundant

Lernaea elegans: Copepod that commonly parasitizes aquarium species

Vandellia cirrhosa: Candiru catfish, blurs the lines between internal & external parasitism

Argulus: A crustacean parasite common in aquarium fishes, on a goldfish fin

Parasitism: symbiosis in which one species benefits and the other is harmed **(+/-)**

- **External** parasites of fishes are speciose and abundant
- **Internal parasites:** less common? or less frequently noticed?

Sea lamprey
on a trout

Head and lateral line erosion, (**HLLE**) or **hole-in-the-head** (**HITH**): disease probably caused by *Hexamita* parasites

Simenchelys parasiticus
snubnose parasitic eel.

parasitic fish living inside a shark heart

Right-bending vs. left-bending ***Perissodus*** **cichlids**

Perissodus **species (Cichlidae) bite the fins and scales off other living fishes**

https://www.youtube.com/watch?v=M2s1CBSXCVs

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Commensalism: one species benefits and the other is unaffected **(+/0)**

- "**scroungers and producers**"
- Many **gobies** live among sponges and corals, sea whips, and brain corals or share burrows created by worms or various shrimplike crustaceans

Yellow watchman goby C*ryptocentrus*

https://www.youtube.com/watch?v=GdC0Akpa2ts

Whip coral goby
Bryaninops yongei on *Cirrhipathes*

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Mutualism: symbiosis in which both species benefit **(+/+)**

- **Most common on coral reefs**
- ”**Cleaning behavior** exists in almost all aquatic environments and involves dozens of shrimp and more than 111 fish species in 29 families”
- Many forms, some more recognizable than others

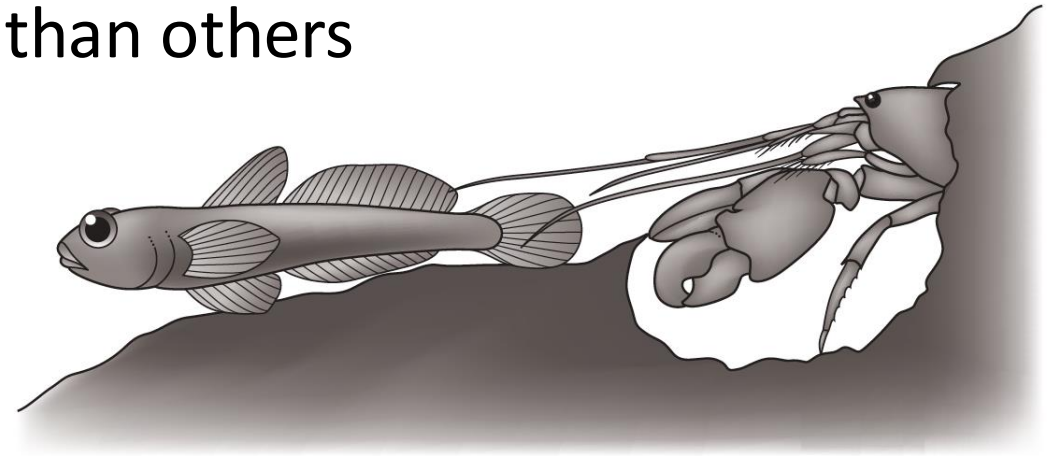
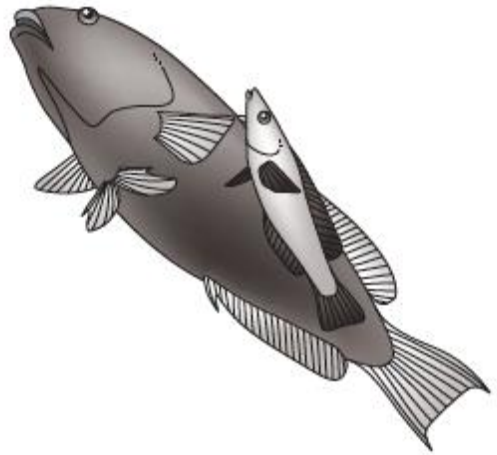


Figure 22.10

Goby–shrimp symbiosis. Several tropical goby species in the Pacific, Indian, and Atlantic oceans live with burrowing alpheid shrimps. The goby stands guard at the burrow entrance while the shrimp excavates and repairs the burrow. The shrimp, which is often functionally blind, maintains contact with the goby via its antennae. If the goby is removed, shrimp will often seal up the burrow entrance and not emerge until the goby is replaced. After Losey (1978).



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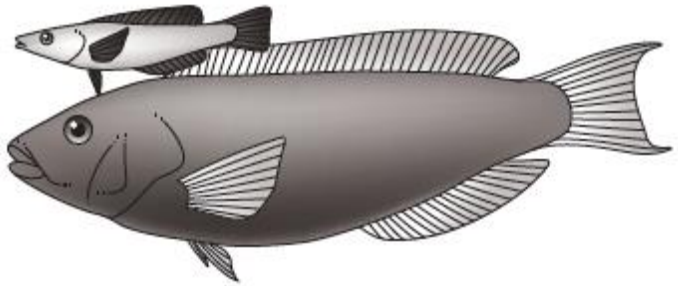

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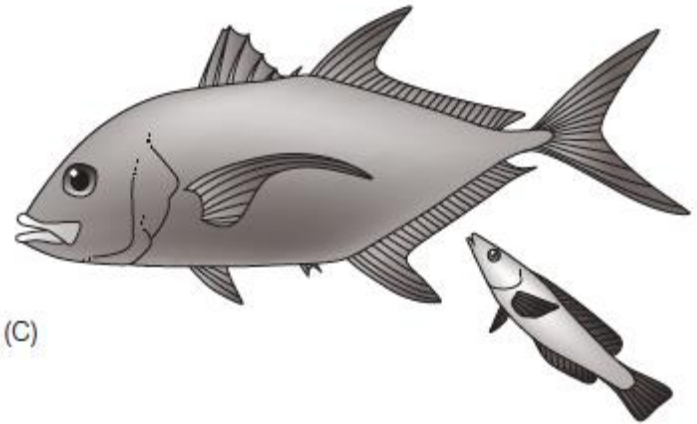

(C)

Figure 22.9

Typical cleaning activities of a cleaner wrasse, *Labroides* sp., from the tropical Pacific. Cleanerfishes exist in almost all habitats, but only in tropical seas are species relatively specialized for this role. (A) A large wrasse poses in a head-up position while the smaller cleaner inspects it for parasites and necrotic tissue, contacting the host with its pelvic, anal, and caudal fins. (B) The cleaner solicits posing from a potential host by riding it while flicking the host with its pelvic fins. (C) The cleaner is about to remove a parasite or necrotic tissue from the anal fin of a carangid. After Losey (1987).

keystone species = taxon whose removal from an ecosystem would result in a dramatically different community composition

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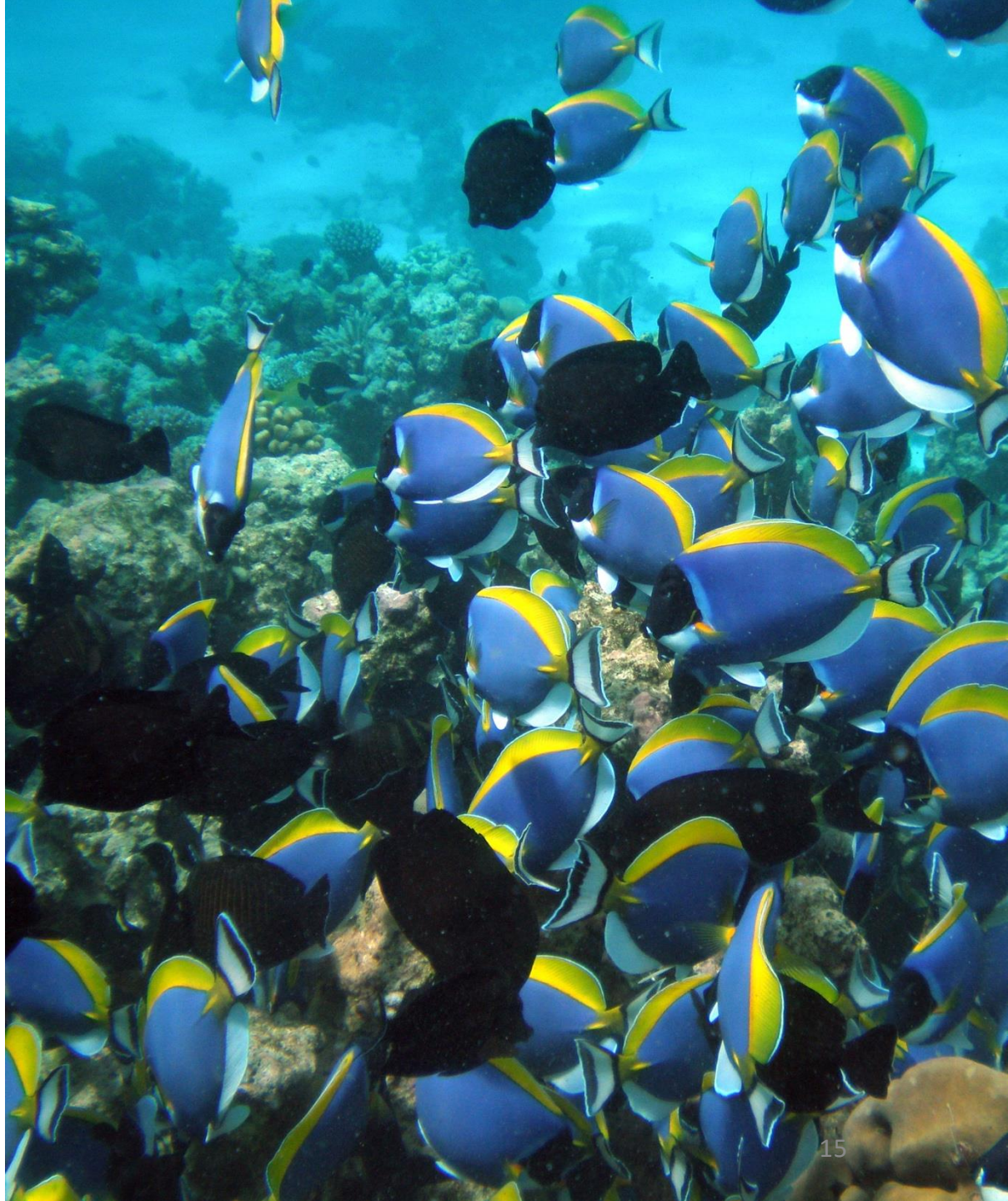
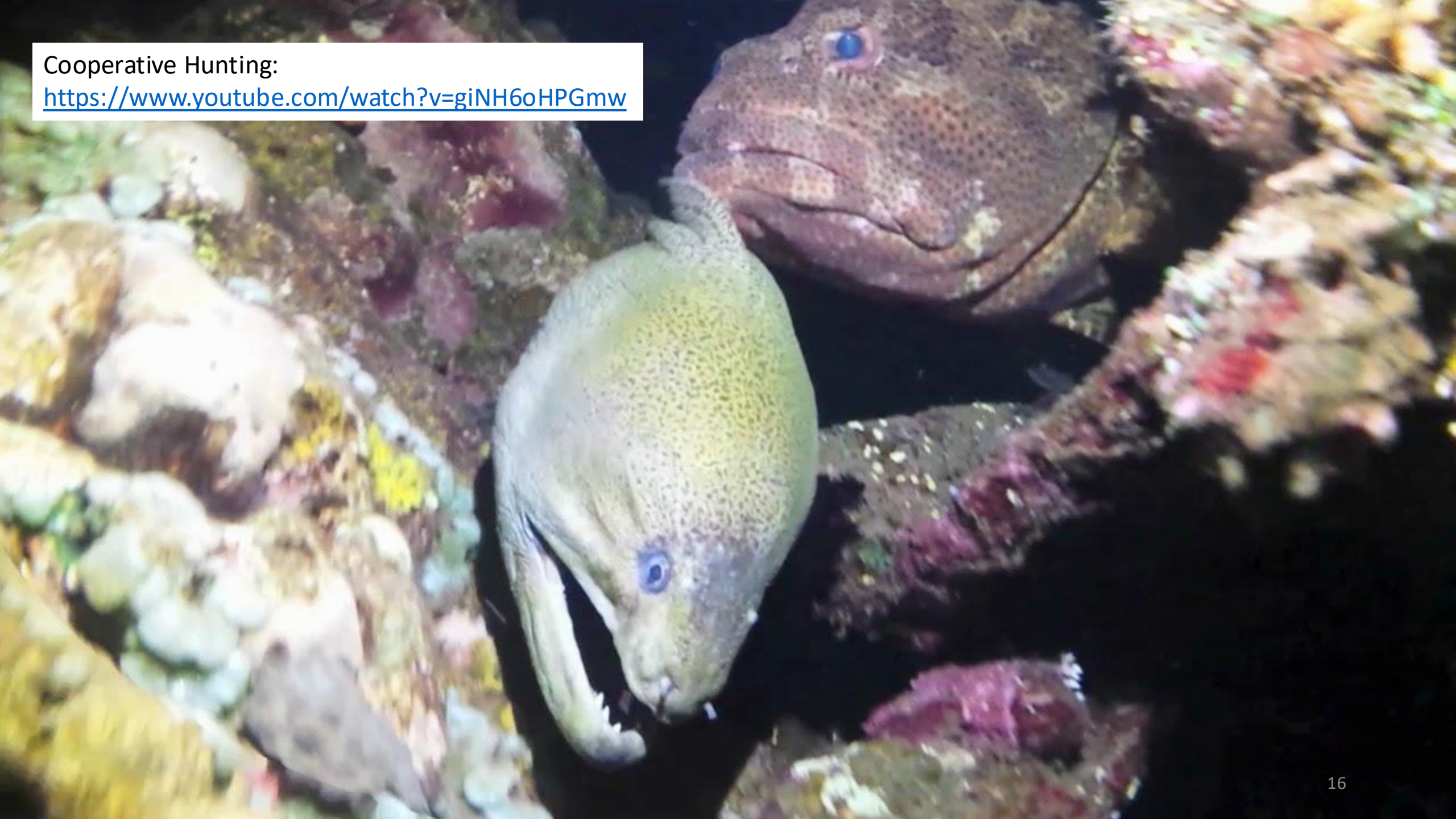
Interspecific **shoaling**

- **Heterospecific shoals** = shoals formed from multiple species (interspecific)
- Aggregate by species, so that “Each fish gains the added benefit of being in a large school but avoids the risk of being the odd individual among another species” (Allan 1986; Parrish 1988, 1989)
- **What are the benefits of life in a group?**




Cooperative Hunting:
https://www.youtube.com/watch?v=giNH6oHPGmw

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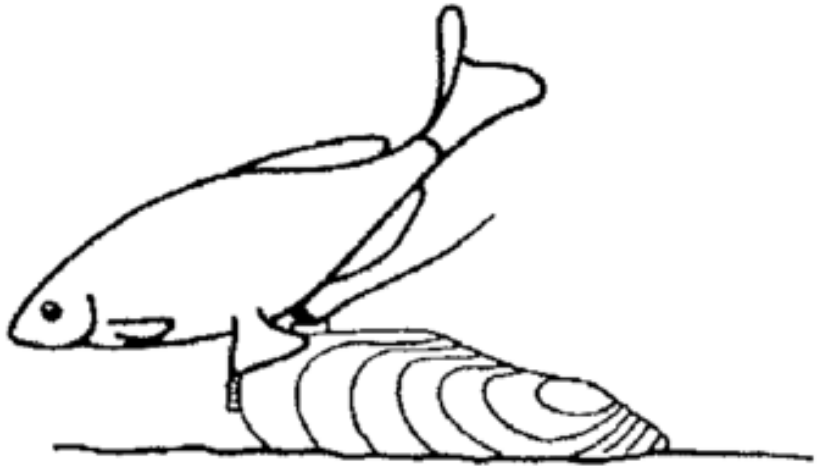
Quiz time!

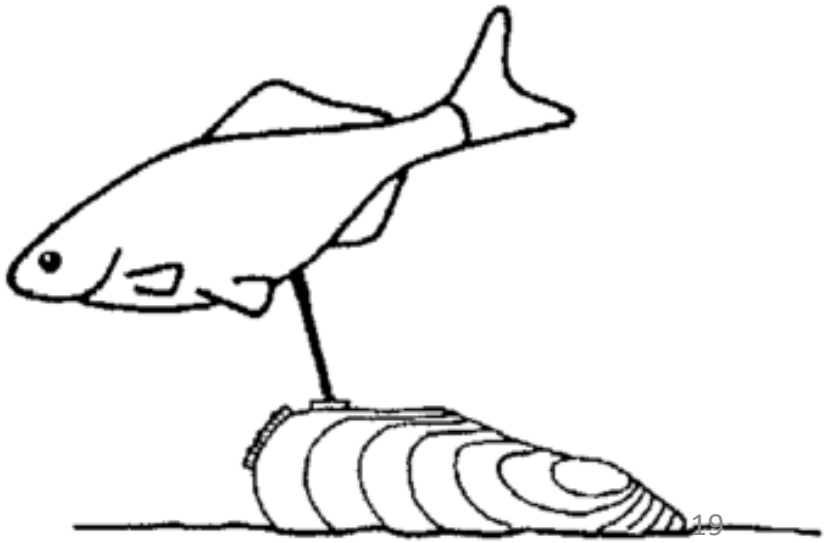
The cutlip minnow *Exoglossum maxilingua* eats only the eyeballs from its living prey

Is this a symbiosis? If so, what kind?

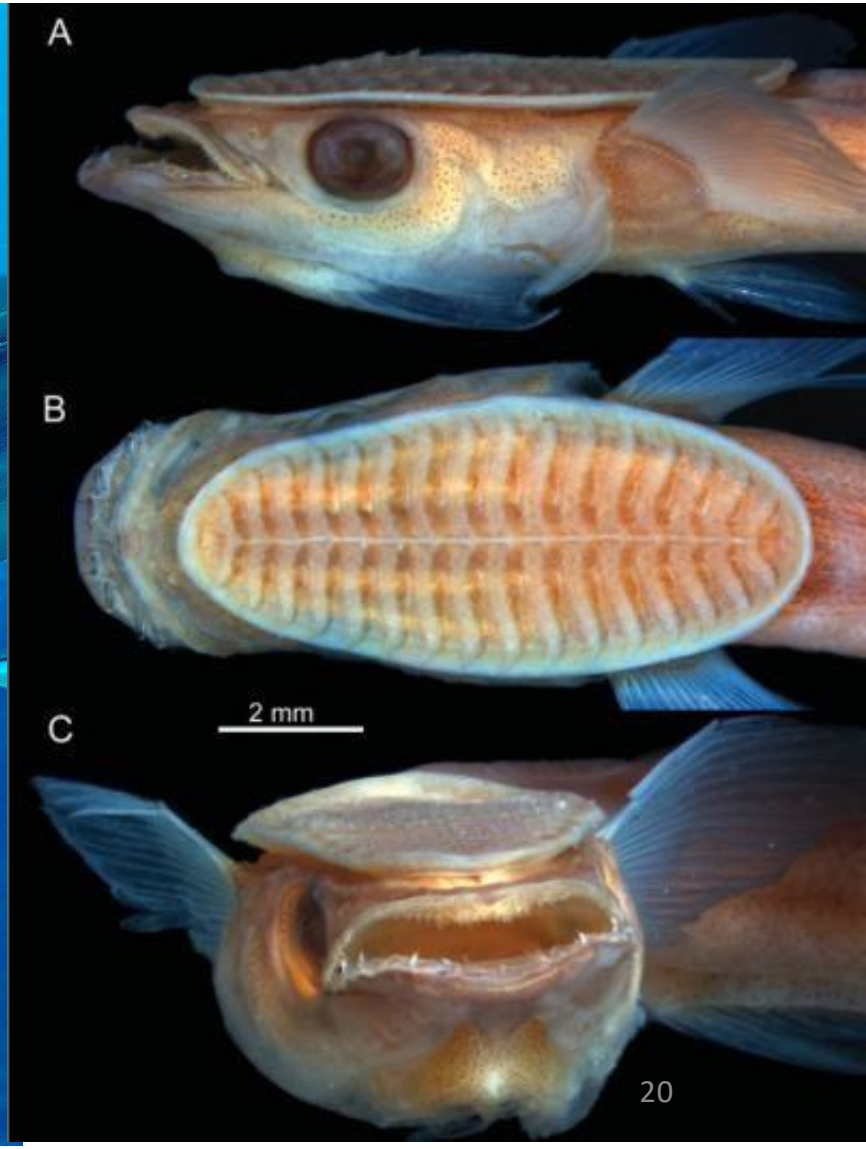
Bitterlings spawn directly into the gill chambers of freshwater mussels.

Is this a symbiosis? If so, what kind?





What type of symbiosis is exhibited by the interaction between a **remora** and a larger fish?



Sabertooth blennies mimic cleanerfishes and then bite unsuspecting prey.

Is this a symbiosis? If so, what kind?

Corkwing wrasses snack on the external parasites of Atlantic Salmon.

Is this a symbiosis? If so, what kind?

Pearlfish (Carapidae) live inside the anuses of sea cucumbers.

Is this a symbiosis? If so, what kind?